

Ch 2 Metric / Measurements

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SJ System

mass - fundamental kilogram (kg)

length - metre (m)

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SJ System

mass - ^{fundamental} kilogram (kg)

length - metre (m)

Temp - $^{\circ}\text{C}$, K Volume - liter / L

Ch 2 CPA Notes D.ink

Ch 2 Metric / Measurements

SJ System

mass - fundamental kilogram (kg)
length - metre (m)
time - seconds (s)

Temp - $^{\circ}\text{C}$, K Volume - liter (L)
Density - $\frac{\text{g}}{\text{mL}}$, $\frac{\text{g}}{\text{cm}^3}$

Ch 2 Metric / Measurements

SI System

fundamental
mass - kilogram (kg)
length - metre (m)
time - seconds (s)

Derived Units

Temp - $^{\circ}\text{C}$, K Volume - liter (L)
Density - $\frac{\text{g}}{\text{mL}}$, $\frac{\text{g}}{\text{cm}^3}$

Base
(1)
meter (m)
liter (L)

deka Base
(da) (1)
10 meter (m)
liter (L)

5 g

Ch 2 CPA Notes D.ink

Kilo	hecto	deka	Base
(k)	(h)	(da)	(1)
1000	100	10	meter (m)
			liter (L)

0.5 kg 5 g

Ch 2 CPA Notes D.ink

Mega	Kilo	hcto	deka	Base
(M)	(k)	(h)	(da)	(1)
1×10^6	1000	100	10	
				meter (m)
				liter (L)

1×10^6	0.005	0.05	0.5	5
Mg	kg	hg	dag	g

Ch 2 CPA Notes D.ink

Biger Mega Kilo Hecto deca Base
(M) (k) (h) (da) (l)
 1×10^6 1000 100 10 meter (m)
liter (L)

1×10^6 0.005 0.05 0.5dag 5 g
Mg ky hg

Ch 2 CPA Notes D.ink

Bigger	Mega (M) 1×10^6	Kilo (k) 1000	hecto (h) 100	deca (da) 10	Base (1) meter (m) liter (L)	deci (d) 0.1
	1×10^6 Mg	0.005 kg	0.05 hg	0.5dg	5 g	50dg

Ch 2 CPA Notes D.ink

Bigger	Mega (M) 1×10^6	Kilo (k) 1000	hecto (h) 100	deca (da) 10	Base (l) meter (m) liter (L)	deci (d) 0.1	centi (c) 0.01	milli (m) 0.001	micro (μ) 1×10^{-6}
	1×10^6 Mg	0.005 kg	0.05 hg	0.5dag 5 g	50dg 500cg 5000mg 5×10^6 μ g				

Ch 2 CPA Notes D.ink

Bigger	Mega (M) 1×10^6	Kilo (k) 1000	hecto (h) 100	deca (da) 10	Base (l) meter (m) liter (L)	deci (d) 0.1	centi (c) 0.01	milli (m) 0.001	micro (μ) 1×10^{-6}	nano (n) 1×10^{-9}
	1×10^6 Mg	0.005 kg	0.05 hg	0.5dag 5g	5dag 500cg	5000 mg	5×10^6 μ g	5×10^9 nm		

Ch 2 CPA Notes D.ink

Mega (M)	Kilo (k)	hecto (h)	deca (da)	Base (l)	deci (d)	centi (c)	milli (m)	micro (μ)	nano (n)
-------------	-------------	--------------	--------------	-------------	-------------	--------------	--------------	--------------------	-------------

$24 \text{ hg} = \underline{\quad? \quad} \text{ mg}$

Ch 2 CPA Notes D.ink

	Mega (M)	Kilo (k)	hecto (h)	deca (da)	Base (l)		deci (d)	centi (c)	milli (m)	micro (μ)	nano (n)
24 hg =	?	mg									

Ch 2 CPA Notes D.ink

Mega (M)	Kilo (k)	hecto (h)	deca (da)	Base (l)	deci (d)	centi (c)	milli (m)	micro (μ)	nano (n)
-------------	-------------	--------------	--------------	-------------	-------------	--------------	--------------	--------------------	-------------

$24 \text{ hg} = \underline{\quad? \quad} \text{ mg}$

24 hg

Mega (M)	Kilo (k)	hecto (h)	deca (da)	Base (l)
-------------	-------------	--------------	--------------	-------------

$$24 \text{ hg} = \underline{\quad ? \quad} \text{ mg}$$

24 hg

deci (d)	centi (c)	milli (m)	micro (μ)	nano (n)
-------------	--------------	--------------	--------------------	-------------

Dimensional Analysis
↳ showing conversion factor
(fractions)

Mega (M)	Kilo (k)	hecto (h)	deka (da)	Base (l)
-------------	-------------	--------------	--------------	-------------

$$24 \text{ hg} = \underline{\quad ? \quad} \text{ mg}$$

24 hg

deci (d)	centi (c)	milli (m)	micro (μ)	nano (n)
-------------	--------------	--------------	--------------------	-------------

Dimensional Analysis
↳ showing conversion factor
(fractions)

Mega (M)	Kilo (k)	hecto (h)	deca (da)	Base (l)
-------------	-------------	--------------	--------------	-------------

$$24 \text{ hg} = \text{?} \text{ mg}$$

$$24 \text{ hg} \times \underline{\hspace{2cm}}$$

deci (d)	centi (c)	milli (m)	micro (μ)	nano (n)
-------------	--------------	--------------	--------------------	-------------

Dimensional Analysis

↳ showing conversion factor
(fractions)

1. multiply by fraction

	Mega (M)	Kilo (k)	hecto (h)	deca (da)	Base (l)
--	-------------	-------------	--------------	--------------	-------------

$$24 \text{ hg} = \text{?} \text{ mg}$$

$$24 \text{ hg} \times \frac{\text{mg}}{\text{hg}}$$

deci (d)	centi (c)	milli (m)	micro (μ)	nano (n)
-------------	--------------	--------------	--------------------	-------------

Dimensional Analysis

↳ showing conversion factor
(fractions)

1. multiply by fraction

2. units convert to → top
" " from → bottom

Mega (M)	Kilo (k)	hecto (h)	deca (da)	Base (l)
-------------	-------------	--------------	--------------	-------------

$$24 \text{ hg} = \text{?} \text{ mg}$$

$$24 \text{ hg} \times \frac{\text{mg}}{\text{hg}}$$

deci (d)	centi (c)	milli (m)	micro (μ)	nano (n)
-------------	--------------	--------------	--------------------	-------------

Dimensional Analysis

↳ showing conversion factor
(fractions)

1. multiply by fraction

2. units convert to → top
" " from → bottom

Mega (M)	Kilo (k)	hecto (h)	deca (da)	Base (1)
-------------	-------------	--------------	--------------	-------------

$$24 \text{ hg} = \text{?} \text{ mg}$$

$$24 \text{ hg} \times \frac{\text{mg}}{1 \text{ hg}}$$

deci (d)	centi (c)	milli (m)	micro (μ)	nano (n)
-------------	--------------	--------------	--------------------	-------------

Dimensional Analysis

↳ showing conversion factor
(fractions)

1. multiply by fraction

2. units convert to → top
" " from → bottom

Mega (M)	Kilo (k)	hecto (h)	deca (da)	Base (l)
-------------	-------------	--------------	--------------	-------------

$$24 \text{ hg} = \text{?} \text{ mg}$$

$$24 \text{ hg} \times \frac{1 \text{ mg}}{1 \text{ hg}}$$

deci (d)	centi (c)	milli (m)	micro (μ)	nano (n)
-------------	--------------	--------------	--------------	-------------

Dimensional Analysis
↳ showing conversion factor (fractions)

1. multiply by fraction
2. units convert to → top
" " from → bottom

For Metrics only
↳ put 1 in front of bigger unit

Mega (M)	Kilo (k)	hecto (h)	deca (da)	Base (1)
-------------	-------------	--------------	--------------	-------------

$$24 \text{ hg} = \text{?} \text{ mg}$$

$$24 \text{ hg} \times \frac{100000 \text{ mg}}{1 \text{ hg}}$$

deci (d)	centi (c)	milli (m)	micro (μ)	nano (n)
-------------	--------------	--------------	--------------	-------------

Dimensional Analysis
↳ showing conversion factor (fractions)

1. multiply by a fraction
2. units convert to top → top
" " from bottom → bottom

For Metrics only

↳ Put 1 in front of Bigger unit
in front of other & put a power of 10
that corresponds to how far apart
the 2 units are.

Mega (M)	Kilo (k)	hecto (h)	deca (da)	Base (1)
-------------	-------------	--------------	--------------	-------------

$$24 \text{ hg} = \text{?} \text{ mg}$$

$$24 \text{ hg} \times \frac{100000 \text{ mg}}{1 \text{ hg}} =$$

deci (d)	centi (c)	milli (m)	micro (μ)	nano (n)
-------------	--------------	--------------	--------------	-------------

Dimensional Analysis

↳ showing conversion factor (fractions)

1. multiply by a fraction

2. units convert to top → top
 " " from bottom → bottom

For Metrics only

↳ Put 1 in front of Bigger unit
 in front of other & put a power of 10
 that corresponds to how far apart
 the 2 units are.

Mega (M)	Kilo (k)	hecto (h)	deca (da)	Base (1)
-------------	-------------	--------------	--------------	-------------

$$24 \text{ hg} = \text{?} \text{ mg}$$

$$24 \text{ hg} \times \frac{100000 \text{ mg}}{1 \text{ hg}} = 2400000 \text{ mg}$$

deci (d)	centi (c)	milli (m)	micro (μ)	nano (n)
-------------	--------------	--------------	--------------	-------------

Dimensional Analysis
↳ showing conversion factor (fractions)

1. multiply by fraction
2. units convert to top → top
" " from bottom → bottom

For Metrics only

↳ Put 1 in front of Bigger unit
in front of other & put a power of 10
that corresponds to how far apart
the 2 units are.

Mega (M)	Kilo (k)	hecto (h)	deca (da)	Base (1)
-------------	-------------	--------------	--------------	-------------

$$24 \text{ hg} = \text{?} \text{ mg}$$

$$24 \text{ hg} \times \frac{100000 \text{ mg}}{1 \text{ hg}} = 2400000 \text{ mg}$$

$$\times \frac{1 \text{ mg}}{0.00001 \text{ hg}}$$

deci (d)	centi (c)	milli (m)	micro (μ)	nano (n)
-------------	--------------	--------------	--------------	-------------

Dimensional Analysis
↳ showing conversion factor (fractions)

1. multiply by fraction
2. units convert to top → top
" " from bottom → bottom

For Metrics only

↳ Put 1 in front of Bigger unit
in front of other & put a power of 10
that corresponds to how far apart
the 2 units are.

Mega (M)	Kilo (k)	hecto (h)	deca (da)	Base (1)
-------------	-------------	--------------	--------------	-------------

$$24 \text{ hg} = \text{?} \text{ mg}$$

$$24 \text{ hg} \times \frac{100000 \text{ mg}}{1 \text{ hg}} = 2400000 \text{ mg}$$

$$\times \frac{1 \text{ mg}}{0.00001 \text{ hg}}$$

$$\times \frac{\text{g}}{\text{hg}} \times \frac{\text{mg}}{\text{g}}$$

deci (d)	centi (c)	milli (m)	micro (μ)	nano (n)
-------------	--------------	--------------	--------------------	-------------

Dimensional Analysis

↳ showing conversion factor (fractions)

1. multiply by a fraction

2. units convert to top → top
 " " from bottom → bottom

For Metrics only

↳ Put 1 in front of Bigger unit
 in front of other to put a power of 10
 that corresponds to how far apart
 the 2 units are.

Mega (M)	Kilo (k)	hecto (h)	deca (da)	Base (1)
-------------	-------------	--------------	--------------	-------------

$$24 \text{ hg} = \text{?} \text{ mg}$$

$$24 \text{ hg} \times \frac{100000 \text{ mg}}{1 \text{ hg}} = 2400000 \text{ mg}$$

$$\times \frac{1 \text{ mg}}{0.00001 \text{ hg}}$$

$$\times \frac{100 \text{ g}}{1 \text{ hg}} \times \frac{1000 \text{ mg}}{1 \text{ g}}$$

deci (d)	centi (c)	milli (m)	micro (μ)	nano (n)
-------------	--------------	--------------	--------------	-------------

Dimensional Analysis
↳ showing conversion factor (fractions)

1. multiply by a fraction
2. units convert to top → top
" " from bottom → bottom

For Metrics only

↳ Put 1 in front of Bigger unit
in front of other & put a power of 10
that corresponds to how far apart
the 2 units are.

$$76 \text{ cL} = \underline{\quad ? \quad} \text{ kL}$$

$$76 \text{ cL} = \underline{\quad ? \quad} \text{ kL}$$

$$76 \text{ cL} \times \frac{\text{kL}}{\text{cL}}$$

$$76 \text{ cL} = \underline{\quad ? \quad} \text{ kL}$$

$$76 \cancel{\text{cL}} \times \frac{\text{kL}}{\cancel{\text{cL}}} =$$

$$76 \text{ cL} = \underline{\quad ? \quad} \text{ kL}$$

$$76 \cancel{\text{cL}} \times \frac{1 \text{ kL}}{1 \times 10^5 \cancel{\text{cL}}} =$$

$$76 \text{ cL} = \underline{\quad ? \quad} \text{ kL}$$

$$76 \cancel{\text{cL}} \times \frac{1 \text{ kL}}{1 \times 10^5 \cancel{\text{cL}}} = \frac{0.00076 \text{ kL}}{7.6 \times 10^4 \text{ kL}}$$

Metric to English Conversions

Metric to English Conversions

Length:

Metric to English Conversions
Length: 1 m = 39.37 in

Metric to English Conversions

Length: $1\text{ m} = 39.37\text{ in}$
 $1.6\text{ km} = 1\text{ mi}$

Length: Metric to English Conversions

 1 m = 39.37 in

 1.6 km = 1 mi

 2.54 cm = 1 in

Metric to English Conversions

Length: $1\text{ m} = 39.37\text{ in}$
 $1.6\text{ km} = 1\text{ mi}$
 $2.54\text{ cm} = 1\text{ in}$

Volume :

Metric to English Conversions

Length: $1\text{ m} = 39.37\text{ in}$
 $1.6\text{ km} = 1\text{ mi}$
 $2.54\text{ cm} = 1\text{ in}$

Volume: $3.78\text{ L} = 1\text{ gal}$ (side note: $1\text{ mL} = 1\text{ cm}^3 = 1\text{ cc}$)

Metric to English Conversions

Length: $1 \text{ m} = 39.37 \text{ in}$

$1.6 \text{ km} = 1 \text{ mi}$

$2.54 \text{ cm} = 1 \text{ in}$

Volume: $3.78 \text{ L} = 1 \text{ gal}$

mass: $454 \text{ g} = 1 \text{ lb}$

$1 \text{ kg} = 2.2 \text{ lbs}$

(side note: $1 \text{ mL} = 1 \text{ cm}^3 = 1 \text{ cc}$)

5.12 gal = _____ mL

5.12 gal = _____ mL

15.12 gal x

$$5.12 \text{ gal} = \underline{\hspace{2cm}} \text{ mL}$$

$$15.12 \text{ gal} \times \frac{\text{L}}{\text{gal}}$$

$$5.12 \text{ gal} = \underline{\hspace{2cm}} \text{ mL}$$

$$15.12 \text{ gal} \times \frac{3.78 \text{ L}}{1 \text{ gal}}$$

$$5.12 \text{ gal} = \underline{\hspace{2cm}} \text{ mL}$$

$$15.12 \cancel{\text{ gal}} \times \frac{3.78 \text{ L}}{1 \cancel{\text{ gal}}} = 57.15 \text{ L}$$

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$$5.12 \text{ gal} = \underline{\hspace{2cm}} \text{ mL}$$

$$15.12 \cancel{\text{ gal}} \times \frac{3.78 \text{ L}}{1 \cancel{\text{ gal}}} \times \frac{1000 \text{ mL}}{1 \text{ L}}$$

$$5.12 \text{ gal} = \underline{\hspace{2cm}} \text{ mL}$$

$$15.12 \cancel{\text{ gal}} \times \frac{3.78 \cancel{\text{ L}}}{1 \cancel{\text{ gal}}} \times \frac{1000 \text{ mL}}{1 \cancel{\text{ L}}} = 57150 \text{ mL}$$

~

$$22.7 \frac{m}{s} = ? \frac{in}{hr}$$

$$22.7 \frac{m}{s} = ? \frac{in}{hr}$$

$$22.7 \frac{m}{s} \times$$

$$22.7 \frac{m}{s} = ? \frac{in}{hr}$$

$$22.7 \frac{m}{s} \times \underline{\hspace{2cm}}$$

$$22.7 \frac{m}{s} = ? \frac{in}{hr}$$

$$22.7 \frac{m}{s} \times \frac{in}{m}$$

$$22.7 \frac{m}{s} = ? \frac{in}{hr}$$

$$22.7 \frac{m}{s} \times \frac{39.37 in}{1 m}$$

$$22.7 \frac{m}{s} = ? \frac{in}{hr} \checkmark$$

$$22.7 \cancel{m} \frac{39.37 in}{1 \cancel{m}}$$

$$22.7 \frac{m}{s} = ? \frac{in}{hr} \checkmark$$

$$22.7 \frac{m}{s} \times \frac{39.37 in}{1 m} \times \frac{s}{hr}$$

$$22.7 \frac{m}{s} = ? \frac{in}{hr} \checkmark$$

$$22.7 \frac{m}{s} \times \frac{39.37 in}{1 m} \times \frac{3600 s}{1 hr}$$

$$22.7 \frac{m}{s} = ? \frac{in}{hr} \checkmark$$

$$22.7 \frac{m}{s} \times \frac{39.37 in}{1 m} \times \frac{3600 s}{1 hr} = 3,217,816.4 \frac{in}{hr}$$

$$22.7 \frac{m}{s} = ? \frac{in}{hr} \checkmark$$

$$22.7 \frac{m}{s} \times \frac{3937 in}{1 m} \times \frac{3600 s}{1 hr} = 3,217,816.4 \frac{in}{hr}$$
$$3,220,000 \frac{in}{hr}$$

$$22.7 \frac{m}{s} = ? \frac{in}{hr} \checkmark$$

$$22.7 \frac{m}{s} \times \frac{3937 in}{1 m} \times \frac{3600 s}{1 hr} = 3,217,816.4 \frac{in}{hr}$$
$$3,220,000 \frac{in}{hr}$$
$$3.22 \times 10^6 \frac{in}{hr}$$

Heat : Temp

Heat : Temp

Heat -

Temperature -

Heat \propto Temp

Heat - Total KE in a
Sample

Temperature -

Heat \propto Temp

Heat - Total KE in a
Sample

Temperature - Avg KE in a
Sample

Heat \propto Temp

Heat - Total KE in a
Sample

Temperature - Avg KE in a
Sample

Heat \propto Temp

Heat - Total KE in a Sample \rightarrow Heat Flows from high to low

Temperature - Avg KE in a Sample

Heat : Temp

Heat - Total KE in a Sample → Heat Flows from high to low
not measured directly → only a change in Heat can be calculated

Temperature - Avg KE in a Sample

Heat \propto Temp

Heat - Total KE in a Sample \rightarrow Heat Flows from high to low
not measured directly \rightarrow only a change in Heat can be calculated $q = m C_p \Delta T$

Temperature - Avg KE in a Sample

Heat \neq Temp

Heat - Total KE in a Sample \rightarrow Heat Flows from high to low
not measured directly \rightarrow only a change in Heat can be calculated $q = m C_p \Delta T$

Temperature - Avg KE in a Sample

Heat \propto Temp

Heat - Total KE in a Sample \rightarrow Heat Flows from high to low
not measured directly \rightarrow only a change in Heat can be calculated $q = m C_p \Delta T$

Temperature - Avg KE in a Sample $-$ can be measured directly

Heat : Temp

Heat - Total KE in a Sample \rightarrow Heat Flows from high to low
not measured directly \rightarrow only a change in Heat can be calculated $q = m C_p \Delta T$

Temperature - Avg KE in a Sample

— can be measured directly
 $1.8(^{\circ}\text{C}) = ^{\circ}\text{F} - 32$

Heat \neq Temp

Heat - Total KE in a Sample \rightarrow Heat Flows from high to low
not measured directly \rightarrow only a change in Heat can be calculated $q = m C_p \Delta T$

Temperature - Avg KE in a Sample \rightarrow can be measured directly
 $1.8(^{\circ}\text{C}) = ^{\circ}\text{F} - 32$ | $\text{K} = ^{\circ}\text{C} + 273$

Accuracy

Precision

Accuracy - how close a measured value
is to the Real or accepted value

Precision - closeness or proximity of a series
of measurements

sig figures

sig figures

sig figures

1. all non-zero (NZ) are sig

sig figures

1. all non-zero (NZ) are sig
44 \rightarrow 2 sf

sig figures

1. all non-zero (NZ) are sig
44 \rightarrow 2 sf
38.2 \rightarrow

sig figures

1. all non-zero (NZ) are sig
44 \rightarrow 2 sf
38.2 \rightarrow 3 sf

sig figures

1. all non-zero (NZ) are sig
44 \rightarrow 2 sf
38.2 \rightarrow 3 sf

2. Zeros b/w NZ are sig

sig figures

1. all non-zero (NZ) are sig
44 \rightarrow 2 sf
38.2 \rightarrow 3 sf
2. Zeros b/w NZ are sig
O sandwich
101 \rightarrow 3 sf

sig figures

1. all non-zero (NZ) are sig
44 \rightarrow 2 sf
38.2 \rightarrow 3 sf
2. Zeros b/w NZ are sig
O sandwich
101 \rightarrow 3 sf
3002 \rightarrow 4 sf

sig figures

1. all non-zero (NZ) are sig
44 \rightarrow 2 sf
38.2 \rightarrow 3 sf
2. Zeros b/w NZ are sig
O sandwich
101 \rightarrow 3 sf
3002 \rightarrow 4 sf
3. 0's to the R of a NZ \neq L
of an undotted decimal \rightarrow not sig

sig figures

1. all non-zero (NZ) are sig

$$44 \rightarrow 2 \text{ sf}$$

$$38.2 \rightarrow 3 \text{ sf}$$

2. Zeros b/w NZ are sig
O sammich

$$101 \rightarrow 3 \text{ sf}$$

$$3002 \rightarrow 4 \text{ sf}$$

3. 0's to the R of a NZ : L
of an undrsted decimal \rightarrow NH sig

$$\text{Ex } \left. \begin{array}{l} 100 \\ 80 \end{array} \right\} 1 \text{ sf}$$

sig figures

1. all non-zero (NZ) are sig

$$44 \rightarrow 2 \text{ sf}$$

$$38.2 \rightarrow 3 \text{ sf}$$

2. Zeros b/w NZ are sig
O sammich

$$101 \rightarrow 3 \text{ sf}$$

$$3002 \rightarrow 4 \text{ sf}$$

3. 0's to the R of a NZ : L
of an undrsted decimal \rightarrow Not sig
If decimal, all sig

$$\text{Ex } \begin{array}{l} 100 \\ 80 \end{array} \} 1 \text{ sf}$$

sig figures

1. all non-zero (NZ) are sig
 $44 \rightarrow 2 \text{ sf}$

$$38.2 \rightarrow 3 \text{ sf}$$

2. Zeros b/w NZ are sig
O sammich

$$101 \rightarrow 3 \text{ sf}$$

$$3002 \rightarrow 4 \text{ sf}$$

3. 0's to the R of a NZ : L
of an undrsted decimal \rightarrow Not sig
If decimal, all sig

$$\text{Ex } \begin{matrix} 100 \\ 80 \end{matrix} \} 1 \text{ sf}$$

$$\begin{matrix} 80. \\ 100. \\ 60.0 \end{matrix}$$

sig figures

1. all non-zero (NZ) are sig
 $44 \rightarrow 2 \text{ sf}$

$$38.2 \rightarrow 3 \text{ sf}$$

2. Zeros b/w NZ are sig
O sandwich

$$101 \rightarrow 3 \text{ sf}$$

$$3002 \rightarrow 4 \text{ sf}$$

3. 0's to the R of a NZ : L
of an understated decimal \rightarrow not sig
If decimal, all sig

$$\text{Ex } \begin{matrix} 100 \\ 80 \end{matrix} \} 1 \text{ sf}$$

$$80. \rightarrow 2$$

$$100. \rightarrow 3$$

$$60.0 \rightarrow 3$$

Sig figures

1. all non-zero (NZ) are sig
44 \rightarrow 2 sf
38.2 \rightarrow 3 sf

2. Zeros b/w NZ are sig
O sammich
101 \rightarrow 3 sf

3. 0's to the R of a NZ \neq L
of an undrsted decimal \rightarrow not sig
If decimal, all sig

4. In #'s $>$, 0's to
the L of 1st NZ digit
are not sig

Sig figures

1. all non-zero (NZ) are sig
44 \rightarrow 2 sf
38.2 \rightarrow 3 sf

2. Zeros b/w NZ are sig
O sammich
101 \rightarrow 3 sf

3. 3002 \rightarrow 4 sf
3. 0's to the R of a NZ \neq L
of an understood decimal \rightarrow not sig
If decimal, all sig

4. In #'s $>$, 0's to
the L of 1st NZ digit
are not sig

0.0031

0.25

Sig figures

1. all non-zero (NZ) are sig
 $44 \rightarrow 2 \text{ sf}$
 $38.2 \rightarrow 3 \text{ sf}$

2. Zeros b/w NZ are sig
O Sammich
 $101 \rightarrow 3 \text{ sf}$
 $3002 \rightarrow 4 \text{ sf}$

3. 0's to the R of a NZ \neq L
of an undotted decimal \rightarrow not sig
If decimal, all sig

4. In #'s > 1 , 0's to
the L of 1st NZ digit
are not sig

$$0.0031 \rightarrow 2 \text{ sf}$$
$$0.25 \rightarrow 2 \text{ sf}$$

Sig figures

1. all non-zero (NZ) are sig
 $44 \rightarrow 2 \text{ sf}$
 $38.2 \rightarrow 3 \text{ sf}$

2. Zeros b/w NZ are sig
O Sammich
 $101 \rightarrow 3 \text{ sf}$
 $3002 \rightarrow 4 \text{ sf}$

3. 0's to the R of a NZ \pm L
of an undrsted decimal \rightarrow Not sig
If decimal, all sig

4. In #'s > 1 , 0's to
the L of 1st NZ digit
are not sig

$$0.0031 \rightarrow 2 \text{ sf}$$
$$0.25 \rightarrow 2 \text{ sf}$$

5. In #'s > 1 , 0's to
the R of last NZ digit
are sig

Sig figures

1. all non-zero (NZ) are sig
 $44 \rightarrow 2 \text{ sf}$
 $38.2 \rightarrow 3 \text{ sf}$

2. Zeros b/w NZ are sig
O Sammich
 $101 \rightarrow 3 \text{ sf}$
 $3002 \rightarrow 4 \text{ sf}$

3. 0's to the R of a NZ : L
of an undotted decimal \rightarrow not sig
If decimal, all sig

4. In #'s > 1 , 0's to
the L of 1st NZ digit
are not sig

$$0.0031 \rightarrow 2 \text{ sf}$$
$$0.25 \rightarrow 2 \text{ sf}$$

5. In #'s > 1 , 0's to
the R of last NZ digit
are sig

$$0.2500$$
$$0.00320$$

Sig figures

1. all non-zero (NZ) are sig
 $44 \rightarrow 2 \text{ sf}$
 $38.2 \rightarrow 3 \text{ sf}$

2. Zeros b/w NZ are sig
0 sandwich
 $101 \rightarrow 3 \text{ sf}$
 $3002 \rightarrow 4 \text{ sf}$

3. 0's to the R of a NZ \pm L
of an undratted decimal \rightarrow not sig
If decimal, all sig

4. In #'s $>$, 0's to
the L of 1st NZ digit
are not sig

$$0.0031 \rightarrow 2 \text{ sf}$$
$$0.25 \rightarrow 2 \text{ sf}$$

5. In #'s $>$, 0's to
the R of last NZ digit
are sig

$$0.2500 \rightarrow 4$$
$$0.00320 \rightarrow 3$$

w/ sf's
Add/sub

w/ sf's

Add/Sub

Round to least

Certain Decimal place

w/ sf's

Add/Sub

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Certain Decimal place

$$2.81\text{g} + 0.883\text{g} = 3.963\text{g}$$

w/ sf's

Add/Sub

Round to least

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$$2.81\text{g} + 0.883\text{g} = 3.96\text{g}$$

w/ sf's

Add/Sub

Round to least

Certain Decimal place

$$2.81 \text{ g} + 0.883 \text{ g} = 3.96 \text{ g}$$

↑
least certain @ 100ths

$$\begin{array}{r} 2.81 \text{ g} \\ + 0.883 \text{ g} \\ \hline \end{array}$$

w/ sf's

Add/Sub

Round to least

Certain Decimal place

$$2.81\text{ g} + 0.883\text{ g} = 3.69\text{ g}$$

↑
least certain 100ths

$$2.81\text{ g}$$

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w/ sf's

Add/Sub

Round to least

Certain Decimal place

$$2.81\text{ g} + 0.883\text{ g} = 3.69\text{ g}$$

$$142.81\text{ mL} - 14\text{ mL} = 128\text{ mL}$$

$$2.81\text{ ? g}$$

$$\begin{array}{r} + 0.883\text{ g} \\ \hline 3.69\text{ g} \end{array}$$

Mult / Div

↳ Round to least #
of sf's given

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$$\frac{28.23g}{14.1mL} =$$

Mult / Div

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$$\frac{28.23g}{14.1mL} = 2.00212766$$

Mult/Div

↳ Round to least #
of sf's given

$$\frac{28.23\text{g}}{14.1\text{mL}} = 2.00 \quad \frac{\text{g}}{\text{mL}}$$

Mult / Div

↳ Round to least #
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$$\frac{28.23\text{g}}{14.1\text{mL}} = 2.00$$

$$D = 1.48\text{ cm}$$

$$h = 12.23\text{ cm}$$

$$\frac{\text{g}}{\text{mL}}$$

Mult/Div

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of sf's given

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$$= 21.0 \text{ cm}^3$$

Proportions

Proportions

Proportions

Direct & Inverse Proport.

Proportions

Direct : Inverse Proport.

Direct

Proportions

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Direct If $x \uparrow$, $y \uparrow$

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Proportions

Direct : Inverse Proport.

Direct If $x \uparrow$, $y \uparrow$ by same constant factor

Proportions

Direct : Inverse Proport.

Direct If $x \uparrow$, $y \uparrow$ by some constant factor (k)

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If $x \uparrow$, $y \uparrow$ by some constant factor (k)

$$y = kx$$

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Proportions

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graph



Proportions

Direct : Inverse Proport.

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Inverse Prop

↳

Inverse Prop

↳ If $x \uparrow$, $y \downarrow$

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graph 

Ex


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$$y = \frac{k}{x}$$

or

$$xy = k$$

graph 

Ex $c = \lambda v$

Inverse Prop

↳ If $x \uparrow$, $y \downarrow$ proportionally by a const

$$y = \frac{k}{x} \quad \text{or} \quad xy = k \quad \text{graph } y \quad \frac{y}{x}$$

$$E_x \quad c = \lambda \nu$$



Density Problems

what is the height
of an Al cylinder
that has a mass 11.0 g
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$$4.07 \text{ cm}^3 = \pi \left(\frac{1.30 \text{ cm}}{2} \right)^2 (h)$$

$$3.06 \text{ cm} = h$$

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Direct Proportions

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x vs y

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Ex:

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constant (vertical arrow pointing to D)
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